

tube) 11 is sufficiently flexible to enable it to bend to accommodate the anatomical curves as shown.

CK
1/17/04

Catheter 10 has a catheter body or catheter tube 11 having a distal end portion 31, a proximal end portion 33, and an intermediate portion 35. Distal portion 31 terminates in nose ⁴²32 which is illustratively substantially conical in shape. Proximal end portion 33 includes hub 12, where the lumens formed within catheter tube 11 are connected, i.e. transition, to the respective inflow and outflow tubes, 16, 18, respectively, to enable return and withdrawal of blood for dialysis. Conventional tube clamps 17 and 19 cut off blood flow through inflow and outflow tubes 16, 18 as desired. As used herein, the terms "inflow" and "outflow" refer to the direction of blood flow with respect to the patient's body such that "inflow" refers to flow from the dialysis machine and delivered to the body while "outflow" refers to flow withdrawn from the body and transported to the dialysis machine.

As shown, intermediate portion of catheter 10 extends through subcutaneous tissue tunnel "t", and curves downwardly toward the target site, e.g. the right atrium. This tunnel "t" secures the catheter in place for dialysis for a period of weeks, or even months, with fibrous cuff 36 (Figure 3) enabling tissue ingrowth. The formation of the tunnel "t" and the insertion of the catheter 10 therethrough will be discussed below in conjunction with the discussion of the catheter insertion method.

It should be appreciated that although the catheter is shown emerging from the tissue tunnel "t" at a second incision site, preferably, the tissue tunnel would not have an exit opening at a second site but instead would exit through the same incision through which initial access is made by the needle and dilator into the internal jugular vein "a". This is described in more detail below.

A series of lumens are formed in catheter tube 11 for transporting blood to and from a dialysis machine. As is well known in the art, a dialysis machine essentially functions as a kidney for patients suffering from kidney failure. Blood is removed from the patient and transported to the dialysis machine where toxins are removed by diffusion through a semi-permeable membrane into a dialysis fluid. The filtered blood is then returned through the catheter body to the patient.